

REMARKS

Claims 1-11 are pending in the present Application. Claim 1 is independent.

Because no further amendments are being submitted herewith, and at least the Zimmermann and Juday references are applied in a comparable manner as before, Applicants hereby incorporate by reference the remarks made in the Amendment filed October 28, 2003 submitting a Declaration by Mr. Kiyotoshi MISAWA.

Claim Rejection – 35 U.S.C. 103; Zimmermann, Nayar and Juday

Claims 1-4 and 7-11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (U.S. Patent 5,185,667), Nayar (U.S. Patent 5,760,826), and Juday et al. (U.S. Patent 5,067,019, hereinafter “Juday”). Applicants respectfully traverse this rejection.

Claim 1 recites, among other things, an omniazimuthal visual system comprising an “image transformation section” which includes

“an arithmetic/logic circuit for performing coordinate transformation of a polar coordinate when the image data is transformed into the display data as a rectangular coordinate with reference to a lookup table of a trigonometric function” [Emphasis added]

Claim Scope

A trigonometric function is known to those of ordinary skill in the art to be a function of an angle expressed as the ratio of two of the sides of a right triangle

that contains that angle; the sine, cosine, tangent, cotangent, secant, and cosecant. Thus, the claimed "lookup table of a trigonometric function" provides the function of sine, cosine, or tangent, etc. for a given input data.

The Office Action states (as had been stated several times before) that "the only thing different between Zimmermann, Nayar and the claimed invention is that the image transformation section (6-7) of Zimmermann uses software similar to the related art (Figure 10) of the application to perform the transforming the image data into display data whereas the claimed invention uses hardware such as a buffer memory, an arithmetic circuit, a lookup table and a CPU to perform the transforming the image data." Instead the Office Action relies on teachings in Juday for teaching the missing hardware.

Applicants submit that Juday, as well as the combination of Zimmermann, Nayar and Juday, fails to teach or suggest at least a lookup table of a trigonometric function in the context claimed. Juday discloses two lookup tables in its system; a "factor look-up table" 36 of weighting factors and an "address look-up table" 34 of addresses. The Office Action states that those lookup tables teach the claimed lookup table of a trigonometric function.

In particular, Juday at column 6, line 64, to column 7, line 18, states that,

"A sequencer 32 creates an identifier i, j of the position of a pixel value as it is input to Collective Processor 20. The function of Address Look-up table 34 is to identify the output position k, l of the output matrix of u columns and v rows. Since the collective processor maps more than one input pixel into a single output pixel, if the "radiance" of an output pixel is to match, for example, the average radiance of its pre-image pixels, the "radiance" or pixel value of the plurality of input pixels must be weighted to produce a single radiance or pixel value for the output pixel. Accordingly, the factor look-up table, with the address i, j of the present pixel $I(i, j)$, includes a pre-computed and stored weighting factor $w(i, j)$ which is applied to multiplier 30 via flow lead 38. As a result, the output on lead 40 from multiplier 30 is $w(i, j) I(i, j)$, which is applied to Adder 42. Adder 42 in cooperation with accumulator memory 46 and flow leads 44, 48 serves to accumulate the weighted input pixels into a location k, l in the accumulator memory 46 corresponding to the output matrix location of the mapping. In other words, the Collective Processor multiplies each incoming pixel value by a weighting factor and places it in a new output address k, l ." Furthermore, Juday at column 7, lines 44-45, states that, "The output addresses (k, l) for each output pixel are stored in an address look-up table (ALUT) 34."

Thus, even given the combination of Zimmermann, Nayar, and Juday, the claimed element of "a lookup table of a trigonometric function" is not taught or suggested. Because not all claimed elements are taught or suggested by the subject references, either alone or in combination, the rejection fails to establish *prima facie* obviousness. Accordingly, Applicants respectfully request that the rejection be withdrawn.

Even if one of ordinary skill in the art were to consider the combination of Zimmermann, Nayar, and Juday, the combination would render Zimmermann

inoperable for its intended purpose, and thereby teaches away from the combination. In re Gordon et al., 221 USPQ 1125 (CAFC 1984); M.P.E.P. 2143.01.

As can be seen by, for example, equations 17 and 18 of Zimmermann at column 7, lines 24 to 54, the image processing system for transforming the circular image to a perspective image involves non-linear functions for mapping between UV **object space** and the XY **image space** (e.g., see Figure 4). Juday discloses transformation of images from a conventional video camera from one Cartesian matrix to another Cartesian matrix. In other words, Juday teaches a system for mapping **image space** to transformed **image space**. For example, Juday teaches image transformation that normalizes pixel radiance values.

In particular, Juday discloses a transformation performed by a collective processor (20 in Figure 2; Figure 3; described in column 6, line 50, to column 8, line 6), which maps multiple input pixels into a single output pixel. The collective processor can perform adjustment of the radiance of output pixels to an average radiance of pre-image pixels (Juday at column 7, lines 1-3) by multiplying its radiance value by a weighting factor (Juday at column 7, lines 3-18; see equation 2). The weighting factors are stored in a Factor Look-up Table 36 and an Address Look-up Table 34 stores output addresses of each output pixel. The normalization of each pixel allows as many as 1024 input pixels to be collected into a single output pixel while preserving the input pixels.

The transformation involved in Zimmermann's approach does not involve compression of one or more pixels into a single output pixel, i.e., a collective processor, in order to normalize radiance of each pixel. Rather, as mentioned above, Zimmermann discloses a technique for transforming an object space to an image space in order to obtain a corrected view of the object (column 7, lines 62-64). Thus, the many-to-one and one-to-many transformations from one image space to another image space of Juday do not apply to the object space to image space transformation of Zimmermann. Therefore, applying Juday's transformation system to Zimmermann would only serve to substantially deviate from its capability of transforming images obtained from a fisheye lens in real time, i.e., rendering it unable to accomplish its intended purpose.

Thus, for this additional reason, Applicants submit that one of ordinary skill would not have been motivated to combine the teachings of Zimmermann, Nayar, and Juday.

Further with respect to claim 4, because Zimmermann's technique involves non-linear operations (e.g., equations 17 and 18), it does not teach or suggest transformation using only linear functions.

Further with respect to claims 10 and 11, Applicants submit that neither Zimmermann nor Juday teach circuits that perform alternative functions and that only require changing one or two, respectively, parameters to perform each of the alternative functions.

Thus, for at least these additional reasons, the rejection fails to establish *prima facie* obviousness for claims 4, 10, and 11.

Accordingly, Applicants respectfully request that the rejection be withdrawn.

Claim Rejection – 35 U.S.C. 103; Zimmermann, Juday, Nobutoshi

Claims 5 and 6 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann, Nayar, and Juday as applied to claim 1 above, and further in view of Nobutoshi (JP 06-295333).

Nobutoshi would not motivate one of ordinary skill to use only linear functions in Zimmermann.

Nobutoshi does appear to teach an optical system having a hyperboloid mirror, but does not teach an image transformation section that uses only linear functions and that can be implemented using a look-up table for a trigonometric function. Also, Nobutoshi does not teach the claimed “rotation axis” since its mirrors are not rotatable. Thus, Nobutoshi fails to make up for the deficiency of Zimmermann of using only linear functions, and in particular, capable of being implemented using a look-up table. Thus, Applicants submit that the rejection fails to establish *prima facie* obviousness.

CONCLUSION

In view of the above remarks, reconsideration of the rejections and allowance of each of claims 1-11 in connection with the above-identified application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222) at the telephone number of the undersigned below, to ***arrange for an interview*** in an effort to expedite prosecution in connection with the present application.

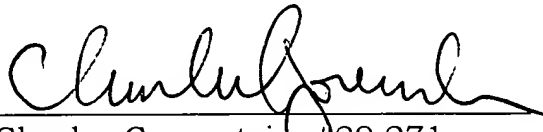
Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for three (3) months extension of time for filing a reply in connection with the present application, and the required fee of \$950.00 is attached hereto.

Appl. No. 09/846,297

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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